Appl. No. 10/634,052
Paper dated August 3, 2005
Reply to Office Action dated June 7, 2005

Amendments to the Claims:

This listing of claims will replace all prior listings of claims in the application.

Listing Of Claims:

Claim 1 (original): An area exposure dosimetry method comprising: calculating an area of an irradiation region, and at least one of an area of an object region and an area of a non-object region in a radiation image obtained by radiographing an object; acquiring an effective dose of radiation from a radiation generator; and calculating an area exposure dose as a radiation dose of the object on the basis of the area of the irradiation region, the calculated one of the area of the object region and the area of the non-object region, and the effective dose.

Claim 2 (original): The method according to claim 1, wherein said calculating areas includes recognizing the irradiation region, and at least one of the object region and the non-object region in the radiation image.

Claim 3 (currently amended): The method according to claim 1, wherein in said calculating, letting M be the effective dose, Sa be the area of the irradiation region, Se be the area of the object region, and Ss be the area of the non-object region, the area exposure dose is calculated by one of M x Se/Sa and M x (Sa-Ss)/Sa.

Claim 4 (original): The method according to claim 1, wherein in said calculating, if the non-object region is not present, the effective dose acquired in the acquiring step is set as the area exposure dose.

Claim 5 (original): The method according to claim 1, wherein in said acquiring, the effective dose is acquired from an area dosimeter provided in the radiation generator.

Claim 6 (original): The method according to claim 1, wherein in said acquiring, the effective dose is calculated from a radiation generation condition for the radiation generator.

Claim 7 (original): An area exposure dosimetry method comprising: recognizing a non-object region and an object region in a radiation image obtained by radiographing an object; calculating a unit area dose as a radiation dose per unit area of the non-object region on the basis of the radiation image; and calculating an area exposure dose as a radiation dose of the object on the basis of the unit area dose and the area of the object region.

Claim 8 (original): The method according to claim 7, wherein in said calculating of the unit area dose, the unit area dose is obtained by conversion of an image signal quantity per unit area of the non-object region.

Claim 9 (original): The method according to claim 8, wherein in said calculating of the unit area dose, the conversion is performed by multiplying the image signal quantity by a predetermined coefficient.

Claim 10 (currently amended): The method according to claim 7, wherein in said calculating of the area exposure dose, letting L be the unit area dose and Se be the area of the object region, the area exposure dose is calculated by L x Se.

Claim 11 (original): The method according to claim 9, further comprising: acquiring an effective dose of radiation from a radiation generator; and updating the coefficient on the basis of the effective dose, the image signal quantity, and the area of the irradiation region in the radiation image.

Claim 12 (original): The method according to claim 11, wherein in said updating the coefficient, letting M be the effective dose, e be the image signal quantity, and Sa be the area of the irradiation region, the coefficient is so updated as to substantially convert (e x Sa) into M.

Claim 13 (original): The method according to claim 11, wherein in said acquiring, the effective dose is acquired from an area dosimeter provided in the radiation generator.

Claim 14 (original): The method according to claim 11, wherein in said acquiring, the effective dose is calculated from a radiation generation condition for the radiation generator.

Claim 15 (original): An area absorbed dosimetry method comprising: recognizing an irradiation region and a non-object region in a radiation image obtained by radiographing an object; calculating a unit area dose as a radiation dose per unit area of the non-object region on the basis of the radiation image; and calculating an area absorbed dose as an absorbed radiation dose of the object on the basis of the unit area dose, the area of the irradiation region, and an overall image signal quantity of the radiation image.

Claim 16 (original): The method according to claim 15, wherein in said calculating of the unit area dose, the unit area dose is obtained by conversion of an image signal quantity per unit area of the non-object region.

Claim 17 (original): The method according to claim 16, wherein in said calculating of the unit area dose, the conversion is performed by multiplying the image signal quantity by a predetermined coefficient.

Claim 18 (currently amended): The method according to claim 15, wherein in said calculating of the area absorbed dose, letting L be the unit area dose, Sa be the area of the irradiation region, and j(i) be a dose which corresponds to an ith pixel of the radiation image constituted by n pixels and is based on an image signal quantity of the pixel, the area absorbed dose is calculated by

$$L \times Sa - \sum_{i=0}^{n} j(i) .$$

Claim 19 (original): The method according to claim 17, further comprising: acquiring an effective dose of radiation from a radiation generator; and updating the coefficient on the basis of the effective dose, the image signal quantity, and the area of the irradiation region in the radiation image.

Claim 20 (original): The method according to claim 19, wherein in said updating the coefficient, letting M be the effective dose, e be the image signal quantity, and Sa be the area of the irradiation region, the coefficient is so updated as to substantially convert (e x Sa) into M.

Claim 21 (original): The method according to claim 19, wherein in said acquiring, the effective dose is acquired from an area dosimeter provided in the radiation generator.

Claim 22 (original): The method according to claim 19, wherein in said acquiring, the effective dose is calculated from a radiation generation condition for the radiation generator.

Claim 23 (currently amended): The method according to claim 19, wherein in said calculating of an area absorbed dose, letting M be effective dose and j(i) be a dose which

corresponds to an ith pixel of the radiation image constituted by n pixels and is based on an image signal quantity of the pixel, the area absorbed dose is calculated by

$$M - \sum_{i=0}^{n-1} j(i).$$

Claim 24 (original): An area exposure dosimetry apparatus comprising: an area calculating unit that calculates an area of an irradiation region, and at least one of an area of an object region and an area of a non-object region in a radiation image obtained by radiographing an object; an acquiring unit that acquires an effective dose of radiation from a radiation generator; and a dose calculating unit that calculates an area exposure dose as a radiation dose of the object on the basis of the area of the irradiation region, the calculated one of the area of the object region or the area of the non-object region, and the effective dose.

Claim 25 (original): The apparatus according to claim 24, wherein said area calculating unit includes an area recognizing unit that recognizes the irradiation region, and at least one of the object region and the non-object region in the radiation image.

Claim 26 (currently amended): The apparatus according to claim 24, wherein letting M be the effective dose, Sa be the area of the irradiation region, Se be the area of the object region, and Ss be the area of the non-object region, said dose calculating unit calculates the area exposure dose by one of M x Se/Sa and M x (Sa-Ss)/Sa.

Claim 27 (original): The apparatus according to claim 24, wherein if the non-object region is not present, said dose calculating unit sets the effective dose acquired by said acquiring unit as the area exposure dose.

Claim 28 (original): The apparatus according to claim 24, wherein said acquiring unit acquires the effective dose from an area dosimeter provided in the radiation generator.

Claim 29 (original): The apparatus according to claim 24, wherein said acquiring unit calculates the effective dose from a radiation generation condition for the radiation generator.

Claim 30 (original): An area exposure dosimetry apparatus comprising: an area recognizing unit that recognizes a non-object region and an object region in a radiation image obtained by radiographing an object; a unit area dose calculating unit that calculates a unit area dose as a radiation dose per unit area of the non-object region on the basis of the radiation image; and a dose calculating unit that calculates an area exposure dose as a radiation dose of the object on the basis of the unit area dose and the area of the object region.

Claim 31 (original): The apparatus according to claim 30, wherein said unit area dose calculating unit obtains the unit area dose by conversion of an image signal quantity per unit area of the non-object region.

Claim 32 (original): The apparatus according to claim 31, wherein said unit area dose calculating unit performs the conversion by multiplying the image signal quantity by a predetermined coefficient.

Claim 33 (currently amended): The apparatus according to claim 30, wherein letting L be the unit area dose and Se be the area of the object region, said dose calculating unit calculates the area exposure dose by L x Se.

Claim 34 (original): The apparatus according to claim 32, further comprising: an acquiring unit that acquires an effective dose of radiation from a radiation generator; and a calibrating unit that updates the coefficient on the basis of the effective dose, the image signal quantity, and the area of the irradiation region in the radiation image.

Claim 35 (original): The apparatus according to claim 34, wherein letting M be the effective dose, e be the image signal quantity, and Sa be the area of the irradiation region, said calibrating unit updates the coefficient so as to substantially convert (e x Sa) into M.

Claim 36 (original): The apparatus according to claim 34, wherein said acquiring unit acquires the effective dose from an area dosimeter provided in the radiation generator.

Claim 37 (original): The apparatus according to claim 34, wherein said acquiring unit calculates the effective dose from a radiation generation condition for the radiation generator.

Claim 38 (original): An area absorbed dosimetry apparatus comprising: a region recognizing unit that recognizes an irradiation region and a non-object region in a radiation image obtained by radiographing an object; a unit area dose calculating unit that calculates a unit area dose as a radiation dose per unit area of the non-object region on the basis of the radiation image; and a dose calculating unit that calculates an area absorbed dose as an absorbed radiation dose of the object on the basis of the unit area dose, the area of the irradiation region, and an overall image signal quantity of the radiation image.

Claim 39 (original): The apparatus according to claim 38, wherein said unit area dose calculating unit obtains the unit area dose by conversion of an image signal quantity per unit area of the non-object region.

Claim 40 (original): The apparatus according to claim 39, wherein said unit area dose calculating unit performs the conversion by multiplying the image signal quantity by a predetermined coefficient.

Claim 41 (currently amended): The apparatus according to claim 38, wherein letting L be the unit area dose, Sa be the area of the irradiation region, and j(i) be a dose which corresponds to an ith pixel of the radiation image constituted by n pixels and is based on an image signal quantity of the pixel, said dose calculating unit calculates the area absorbed dose by

$$L \times Sa - \sum_{i=0}^{n} j(i) .$$

Claim 42 (original): The apparatus according to claim 40, further comprising: an acquiring unit that acquires an effective dose of radiation from a radiation generator; and a calibrating unit that updates the coefficient on the basis of the effective dose, the image signal quantity, and the area of the irradiation region.

Claim 43 (original): The apparatus according to claim 42, wherein letting M be the effective dose, e be the image signal quantity, and Sa be the area of the irradiation region, said calibrating unit updates the coefficient so as to substantially convert (e x Sa) into M.

Claim 44 (original): The apparatus according to claim 42, wherein said acquiring unit acquires the effective dose from an area dosimeter provided in the radiation generator.

Claim 45 (original): The apparatus according to claim 42, wherein said acquiring unit calculates the effective dose from a radiation generation condition for the radiation generator.

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Claim 46 (currently amended): The apparatus according to claim 42, wherein letting M be effective dose and j(i) be a dose which corresponds to an ith pixel of the radiation image constituted by n pixels and is based on an image signal quantity of the pixel, said dose calculating unit calculates the area absorbed dose by

$$M - \sum_{i=0}^{n-1} j(i).$$

Claim 47 (original): A storage medium readable by a data processing apparatus, said storage storing a program which is executable by the data processing apparatus and comprises program codes realizing the area exposure dosimetry method described in claim 1.

Claim 48 (original): A storage medium readable by a data processing apparatus, said storage storing a program which is executable by the data processing apparatus and comprises program codes realizing the area absorbed dosimetry method described in claim 15.

Claim 49 (original): A radiographing apparatus comprising: each means described in an area exposure dosimetry apparatus defined in claim 24; and an image sensing unit that acquires the radiation image.

Claim 50 (original): A radiographing apparatus comprising: each means described in an area absorbed dosimetry apparatus defined in claim 38; and an image sensing unit that acquires the radiation image.

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